Hydrological modellers User GUIDE

Author: Roberto Ranzi with the contribution of several authors,
mainly Simon Jaun, Claudia Wunram, Marco Arpagaus

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Basic News:

1. In mid August the Visualisation Platform (VP) started to plot Hydrological Forecasts. Until now output from the HBV and PREVAH models in Switzerland, and LARSIMBY in Germany are plotted. DIMOSOP was run for Italy for some precipitation events, but the syntax of the .xml alert file is still being checked. You can browse the hydrological forecasts by clicking on the boxes at the Level 3 of the VP.
2. The coding of impact areas and river_at_stations was fixed as in the file impact-areas_20070816+RR.xls in the DPHASE_HYDRO_package30.zip
3. The syntax of the .xml alert file slightly changed (see Chapter 3)
4. The syntax of the image files names slightly changed (see Chapter 4)
5. The general_info_data_archive.pdf Data Archive user guide file of may 22 is available on the DPHASE Website (Chapter 5)
6. The syntax of the image files folder to be sent to the VP ftp site was better defined (see Chapter 6)
7. An updated documentation with codes and example files was distributed by Marco Arpagaus and included in a new DPHASE_HYDRO_package30.zip.

FOR HYDROLOGICAL MODELLERS

- Useful e.mail list:

Marco.Arpagaus@meteoswiss.ch
VP Gerhard Kittel d-phase@ng-software.at
Data Interface Andrea Montani amontani@arpa.emr.it
.nc .xml .png Simon Jaun <simon.jaun@env.ethz.ch>
WDCC Contact person: Claudia Wunram cops@zmaw.de

ftp list

VP To upload xml files:
ftp.d-phase.info
user: dphaseuserxml
pwd: welcome

VP To upload images:
ftp.d-phase.info
user: dphaseuserimages
pwd: welcome

ftp **archive.dkrz.de**
Login:
Password:

http list
MDC www.map.meteoswiss.ch.
VP www.d-phase.info
ISACMOL Visualisation: http://www.isac.cnr.it/dinamica/projects/dphase/

1. **Meteorological data**

Meteorological data will be made available after bilateral agreement with the data providers. The list of models and the contact person are indicated in the attached file from Claudia Wunram. For the e.mail addresses visit the www.map.meteoswiss.ch.

For instance for:
COSMO LEPS contact Andrea Montani amontani@arpa.emr.it or Davide Cesari dcesari@arpa.emr.it

And so on.

2. **Output of hydrological models in .netcdf format**

Simon Jaun attached the source code, which is used to generate the NetCDF file (if you want to take a look at it) (src_prevah2cf_20070518.tgz). If you do not find actual packages for your linux installation, compiling and installing from source works generally without problems. Make

sure, that the libraries are compiled with the same compiler you plan to use for the provided fortran code.

http://www.unidata.ucar.edu/downloads/netcdf/netcdf-3_6_2/index.jsp

http://www.unidata.ucar.edu/software/netcdf/docs/netcdf-install/Quick- Instructions-for-Installing-NetCDF-on-Unix.html#Quick-Instructions- for-Installing-NetCDF-on-Unix

For visualisation you can use IDV at the site http://www.unidata.ucar.edu/software/idv/ or, better ncview (http://meteora.ucsd.edu/ ~pierce/ncview_home_page.html) for spatial data (temperature/rain fields). But this applications are not of much use for point data as hydrologists produce it. Simon Jaun recommends to use ncdump (text output for a quick overview), which is available on your system after the installation of the NetCDF libraries.

ncdump -c 2007030500_prevah_cosmoch7_d.nc (shows variables and attributes)
ncdump -v runoff 2007030500_prevah_cosmoch7_d.nc (shows runoff data)
ncdump -v station_names 2007030500_prevah_cosmoch7_d.nc (shows names of considered stations)

Coding of the impact areas uses the infos of the new file impact-areas_20070816+RR.xls in DPHASE_HYDRO_package30.zip (see also the .xml chapter and Appendix)

3. Output of alert messages in .xml format

Alert .xml files as in the Appendix 1 can be generated using a text editor or using the **xml package enclosed in the attached DPHASE_HYDRO_package30.zip file**

Upload XML files and graphs to the VP. The VP uses the xml file to read in and display your warning information and sets links to the according graphs. Then, graphs and xml files are sent to dkrz.de for archiving purposes, as well as the originating simulation data in the NetCDF format.

Set the date_of_expiration value in the xml file to a reasonable time (e.g. if you run your model once a day for initial time (IT) 06 UTC and typically deliver the products 4hrs after IT the latest, a good choice would be IT + 2*24h (one run lost) + 4h = IT + 52h). - Please note that all information with a date_of_expiration in the past are immediately removed from the VP!

- NEVER send old xml files to the VP, since it is always assumed that a newer xml file contains newer data (and therefore the old information is removed from the VP database!).

Deterministic models

In the example .xml alert message in Appendix you will find marked in evidence the changes we can notice with respect to the version 2.0. I draw your attention on three key issues:

- the <alert region_short> code is taken from the REGION SHORT column in the impact-areas_20070816+RR.xls file, where you will find also the values of the hydrological thresholds Q1, Q2, Q3. They represent peak flows with return period of about 60 days, 180 days and 10 years . <region_short> corresponds to the "Unique station number" from the NetCDF-file, <region> is a combination from rivernames (e.g. Verzasca) and stationnames

(e.g. at Lavertezzo) from the NetCDF-file. Both, <region_short> and <region> need to conform to the definitions in the .xls file

- the <regions_details start="2007081301"> is one hour later than the forecaststart and we have 72 forecast values. This means that the value at time forecaststart "2007081300" (when the meteorological forecast or observation started) was measured or estimated somehow, while the value at time regions_details start is the first actual forecast;
- The <alert_comment> line is only for the <regions_details> block. It includes the value, date and time of the peak flow for Deterministic models. Example <alert_comment>**max: 7.244 m3/s on Mon 13.08, 01 UTC**</alert_comment>

```
  <forecaststart>2007081300</forecaststart>
    <forecastend>2007081600</forecastend>
    <date_of_expiration>2007081513</date_of_expiration>
  </header>
- <!--
 Level 3 ========================================
  -->
- <regions_details start="2007081301" end="2007081600" deltahour="1" nof_timesteps="72">
  - <alert region_short="CH_2605" region="VERZASCA_AT_LAVERTEZZO">
      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
      <link>2007081300_prevah_cosmoch7_CH_2605.png</link>
      <alert_comment>max: 7.244 m3/s on Mon 13.08, 01 UTC</alert_comment>

    </alert>
  ……..
  - <alert region_short="CH_2167" region="TRESA_AT_ROCCHETTA">
      1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
       1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
      <link>2007081300_prevah_cosmoch7_CH_2167.png</link>
      <alert_comment>max: 22.875 m3/s on Mon 13.08, 01 UTC</alert_comment>
</alert>
```

As before the **line** with 0s, 1s, 2s, 3s means that, if in the time step k, the runoff computed by your hydrological model in deterministic mode or 33% of the runoff hydrographs computed in Ensemble Prediction mode will be below the Q1 threshold you will need to set 0 in the line following the <alert region_short....> block, in the k-th position. If the runoff in deterministic mode or 33% of the ensemble hydrographs will exceed only the Q1 threshold you will set 1 in the alert line in the k-th position, then you will set 2 if the model will exceed the Q2 threshold only, and 3 if the Q3 threshold will be exceeded.

Ensemble models

In the example .xml alert message in Appendix you will find marked in evidence the major changes we can notice with respect to the version 2.0. I draw your attention on four key issues:

- the <alert region_short> see above;
- the <regions_details start="2007081301"> see above;
- <prob> only for ProbHydro, the fraction of the ensemble reaching the respective threshold is given for every timestep (in %).
- The <alert_comment> line for ProbHydro includes the maximum of: ensemble median, the whole ensemble and ensemble spread.

```
<?xml version="1.0" ?>
- <alert_message>
  - <!--
    General information ==============================
    -->
  - <header>
      <author>prevah_cleps</author>
      <type>ProbHydro</type>
      <modelname>PREVAH, IAC-ETH/WSL</modelname>
      <drivingdata>COSMO LEPS, MeteoSwiss</drivingdata>
      <forecaststart>2007081300</forecaststart>
      <forecastend>2007081800</forecastend>
      <date_of_expiration>2007081513</date_of_expiration>
    </header>
  - <!--
    Level 3 ========================================
    -->
  - <regions_details start="2007081301" end="2007081800" deltahour="1"
      nof_timesteps="120">
    - <alert region_short="CH_2605" region="VERZASCA_AT_LAVERTEZZO">
        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
        <prob>100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 100 100 100 100 100 100 100
          100 100 100 100 100 100 100 94 88 88 88 88 81 81 81 88 88
          81 81 88 81 81 81 81 81 75 81 81 81 81 81 94 94 94 100 100
          100</prob>
        <link>2007081300_prevah_cleps_CH_2605.png</link>
        <alert_comment>max median: 15.784 m3/s on Fri 17.08, 21 UTC;
          max member: 297.192 m3/s on Fri 17.08, 10 UTC; max
          spread: 293.255 m3/s on Fri 17.08, 10 UTC</alert_comment>
```

The block of the first 59 stations of the .xls file are visualised on the Visualisation platform. This means that the following two blocks of stations in Germany and Italy can be simulated and transferred to the Data Archive. In principle they can be visualised also to the VP ftp sites. Contact Roberto Ranzi if you are interested in this option.

4. Output of figures in .png format

Graphs files in .png (or .jpg) format as in the Appendix 1 can be generated with any graphics package. The sintax of the names changed. **No more suffix _p**. The region_short code should be added, instead. Example 2007042312_DIMOSOP_CLEPS_it_oglio.png. **But** when you have prepared all your.png or .jpg files they need to be shipped to the VP as tar (or zip) file
(the tar file must not have any internal directories and contains all png files), where the naming convention for the tar file is (case insensitive)
<INIDATE(10)>_<MODEL(8)>_<DRIVINGDATA(8)>_P.tar.
e.g. 2007042312_DIMOSOP_CLEPS_P.zip or 2007042312_DIMOSOP_CLEPS_P.tar. The agreement between VP and DA standards on this issue is still pending.

5. Data Archive at WDCC:DA

News are reported on the general_info_data_archive on the web

ftp **archive.dkrz.de**
Login:
Password:
Contact person: Claudia Wunram cops@zmaw.de

Data netcdf .nc files, graphic .png images and .xml alert messages need to be sent to the Data Archive by **one responsible person only** (also in delayed time) Password of hydrological modellers can be given through Christoph Hegg for (A-CH-D) and Roberto Ranzi (I-SLO-HR). Ask them and you will receive from the Data Archive people.

For Windows systems install Cygwin http://www.cygwin.com/setup.exe

which can be downloaded from http://www.cygwin.com
(Install or update now!)
When Cygwin is installed it creates a homedirectory. In this directory you need to copy the file **make_ckecksum.sh** (attached and in the Appendix 1)

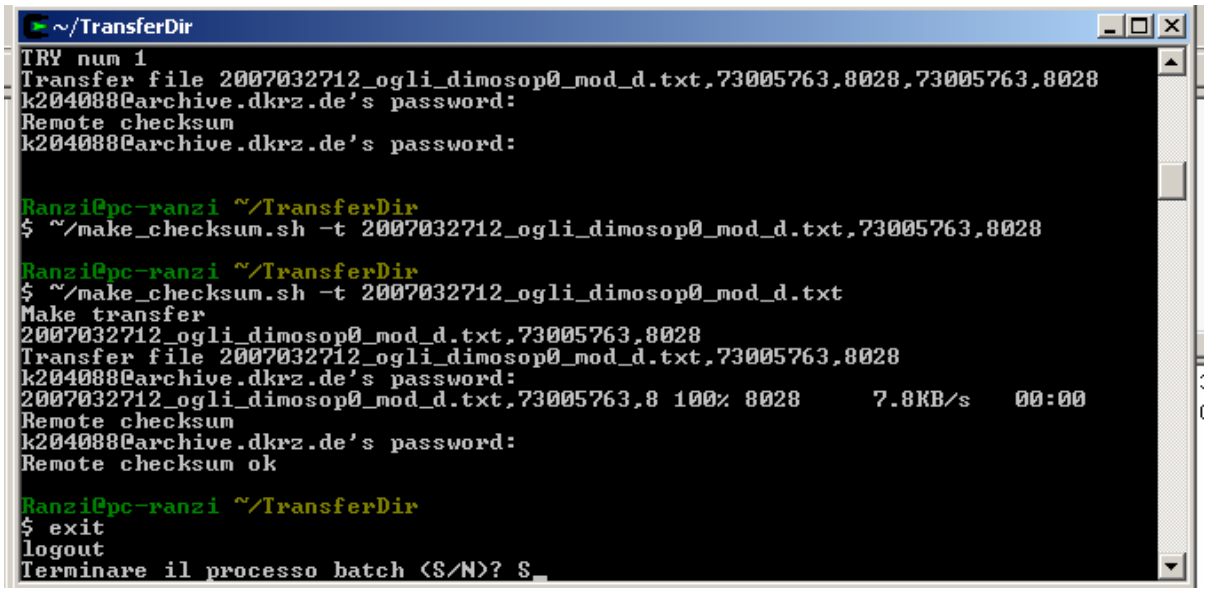
Before ftp your model output data to the WDCC World Data Center for Climate at the ftp site **archive.dkrz.de** you need to do a checksum on your computer using the file **make_ckecksum.sh** produced by Davide Cesari dcesari@arpa.emr.it and slightly updated by the UNIBS System Administator.

Copy the file FILENAME to be trasferred (model output in netcdf .nc or figures files in .png . or alert files in .xml format) in another directory e.g. homedirectory/TransferDir

Execute Cygwin
It creates a shell with your homedirectory
cd TransferDir
Execute:
~/make_checksum.sh -t FILENAME

Digitize the password twice

Check that appears the text
“Remote checksum ok”



NEW! 22.05 from Claudia Wunram:

Here are some important news on
(1) the upload area and
(2) the meta data generation tool

(1) In preparation for the 'real project phase' we have to switch to another upload area filesystem, which means that you will have to update the upload path names in your scripts as well.

```
The following directory paths will be available for data upload
*** from Wednesday 23rd Mai 2007 (6pm MEST) on                                  ***
*** and will remain the same (if no emergency happens) during the whole project period:
***
*** for data upload please change your scripts to:                              ***
*** /prj/mh0388/work1/dphase/                                                   ***
***
*** the checksum scripts are available under:                                   ***
*** /prj/mh0388/work1/scripts/                                                  ***
***
```

```
Please take care, that you update the directories in your upload scripts.
The 'dryrun'-directories will be closed down at the same time.

Please find attached as well the actual version of the 'general_info'.

I would like to encourage especially the hydrologists, to announce the details of their
respective data uploads, as some information is still missing, which is needed to prepare
the data flow.

(2) As you already know, for archiving your data we need some detailed information on
your data files (and content), which is called meta data.
```

Last 23.05 Claudia Wunram sent us the meta-data-tool "xforms250307.tar" and the users guide "info_meta_data.230507.pdf". They are annexed in the DPHASE_HYDRO_package30.zip. Read the users guide for installation and usage details.

FOR HYDROLOGICAL MODELLERS AND END USERS

6. Visualisation platform:VP

The visualisatiom platform is accessible at the Web site www.d-phase.info. Password of hydrological modellers and end users can be given through Christoph Hegg for (A-CH-D) and Roberto Ranzi (I-SLO-HR). Ask them and you will receive from the Visualisation Platform people.

Login:.....
Password:.....
Gerhard Kittel d-phase@ng-software.at
Marco.Arpagaus@meteoswiss.ch

.jpg/.png images in .zip/.tar folders (see above) and .xml alert messages can be sent to the visualisation platform by hydrological modellers by more than one responsible person.

The upload area on the Visualisation Platform is still as follows

To upload xml files:
---

ftp.d-phase.info
user: dphaseuserxml
pwd: welcome

To upload images:
---

ftp.d-phase.info
user: dphaseuserimages
pwd: welcome

End users can visualise the result by browsing the site.

Appendix 1.1 Example of nc_almo7.config configuration file for netcdf format coding as prevah2cf.bin.

```
"/data/sjaun/map_opr/forecasts/netcdf/2007081300_prevah_cosmoch7_d.nc" ! filename_out
!###### nc globals ##########################
"hydrological forecasts, deterministic"  ! title
"IAC-ETH/WSL"           ! institution
"MAP-DPHASE"            ! experiment
"simon.jaun@env.ethz.ch"      ! contact 1
"massimiliano.zappa@wsl.ch"   ! contact 2
"http://www.map.meteoswiss.ch/map-doc/dphase/dphase_info.htm"    ! project reference
"PREVAH"          ! hydrological model
"www.wsl.ch/hazards/prevah/"  ! reference to hydrological model
"COSMO LM7, MeteoSwiss" ! source of meteo data
"www.meteosuisse.ch/web/en/weather/models.html"! reference to meteo source
2007081300  ! init_time meteo model
2007081301  ! init_time of hydrological model
72              ! number of timesteps
!###### variable definitions ###############
3               ! number of variables
-9999           ! missing_value
!****************************************
"runoff"                ! varname
"Runoff (from hydrol. model)" ! long_name
"m3/s"                  ! units, runoff input in mm/h -> conversion
!****************************************
"precip"                ! varname
"Mean area precipitation (driving hydrol. model)"    ! long_name
"mm/h"                  ! units
!****************************************
"soilmoist"             ! varname
"Soil moisture storage (from hydrol. model)"   ! long_name
"mm"            ! units
!###### simulation definitions #############
1               ! number of ensemble members
!****************************************
"cosmoch7"        ! member name
-1              ! member weight (-1 for deterministic run)
"/data/sjaun/map_opr/forecasts/almo7_prevah/almo7_2007081300/" ! path to output (per member)
!###### station definitions ################
8               ! number of stations
!****************************************
"Lavertezzo"      ! station_name
```

```
"Verzasca"        ! river_name
"CH_2605"         ! station_number
46.24897          ! lat
8.844555          ! lon
490.0             ! height
186.0             ! area
186.0             ! tot_area
0.0               ! glaciation
0.0               ! tot_glaciation
42.0              ! max_soilm
42.0              ! tot_max_soilm
!-----------------------------------------
"routed/riv_Ver500.tmp" ! input file name (for variable 1)
0                 ! header rows (input file)
5                 ! number of columns (input file)
5                 ! column number for runoff (variable 1)
!-----------------------------------------
"Ver500.std"            ! input file name (for variable 2)
2                 ! header rows (input file)
22                ! number of columns (input file)
6                 ! column number for precip (variable 2)
!-----------------------------------------
"Ver500.std"            ! input file name (for variable 3)
2                 ! header rows (input file)
22                ! number of columns (input file)
17                ! column number for soilmoisture (variable 3)
!*****************************************
"Solduno"   ! station_name
"Maggia"          ! river_name
"CH_2368"         ! station_number
46.16832          ! lat
8.773584          ! lon
202.0             ! height
926.0             ! area
926.0             ! tot_area
0.9               ! glaciation
0.9               ! tot_glaciation
75.0              ! max_soilm
75.0              ! tot_max_soilm
!-----------------------------------------
"routed/riv_Mag500.tmp" ! input file name (for variable 1)
0                 ! header rows (input file)
```

```
5                ! number of columns (input file)
5                ! column number for runoff (variable 1)
!-----------------------------------------
"Mag500.std"           ! input file name (for variable 2)
2                ! header rows (input file)
22               ! number of columns (input file)
6                ! column number for precip (variable 2)
!-----------------------------------------
"Mag500.std"           ! input file name (for variable 3)
2                ! header rows (input file)
22               ! number of columns (input file)
17               ! column number for soilmoisture (variable 3)
!*****************************************
"Bellinzona"           ! station_name
"Ticino"         ! river_name
"CH_2020"        ! station_number
46.19376         ! lat
9.009288         ! lon
220.0            ! height
1515.0                ! area
1515.0                ! tot_area
0.7              ! glaciation
0.7              ! tot_glaciation
54.0             ! max_soilm
54.0             ! tot_max_soilm
!-----------------------------------------
"routed/riv_Bel500.tmp" ! input file name (for variable 1)
0                ! header rows (input file)
5                ! number of columns (input file)
5                ! column number for runoff (variable 1)
!-----------------------------------------
"Bel500.std"           ! input file name (for variable 2)
2                ! header rows (input file)
22               ! number of columns (input file)
6                ! column number for precip (variable 2)
!-----------------------------------------
"Bel500.std"           ! input file name (for variable 3)
2                ! header rows (input file)
22               ! number of columns (input file)
17               ! column number for soilmoisture (variable 3)
!*****************************************
"Rocchetta"      ! station_name
```

```
"Tresa"                 ! river_name
"CH_2167"         ! station_number
45.97199          ! lat
8.852406          ! lon
270.0             ! height
615.0             ! area
615.0             ! tot_area
0.0               ! glaciation
0.0               ! tot_glaciation
237.0             ! max_soilm
237.0             ! tot_max_soilm
!-----------------------------------------
"routed/lak_Tre500.tmp" ! input file name (for variable 1)
0                 ! header rows (input file)
8                 ! number of columns (input file)
8                 ! column number for runoff (variable 1)
!-----------------------------------------
"Tre500.std"            ! input file name (for variable 2)
2                 ! header rows (input file)
22                ! number of columns (input file)
6                 ! column number for precip (variable 2)
!-----------------------------------------
"Tre500.std"            ! input file name (for variable 3)
2                 ! header rows (input file)
22                ! number of columns (input file)
17                ! column number for soilmoisture (variable 3)
!*****************************************
"Candoglia"       ! station_name
"Toce"                  ! river_name
"IT_TOCE"         ! station_number
45.9667                 ! lat
8.4167                  ! lon
193.0             ! height
1534.0                  ! area
1534.0                  ! tot_area
1.0               ! glaciation
1.0               ! tot_glaciation
42.0              ! max_soilm
42.0              ! tot_max_soilm
!-----------------------------------------
"routed/riv_Toc500.tmp" ! input file name (for variable 1)
0                 ! header rows (input file)
```

```
5                ! number of columns (input file)
5                ! column number for runoff (variable 1)
!----------------------------------------
"Toc500.std"           ! input file name (for variable 2)
2                ! header rows (input file)
22               ! number of columns (input file)
6                ! column number for precip (variable 2)
!----------------------------------------
"Toc500.std"           ! input file name (for variable 3)
2                ! header rows (input file)
22               ! number of columns (input file)
17               ! column number for soilmoisture (variable 3)
!****************************************
"Miorina"        ! station_name
"Ticino"         ! river_name
"IT_MIORINA"           ! station_number
45.702                 ! lat
8.653            ! lon
190              ! height
1823.0                 ! area eigentlich 1769 -> aber 54km fehlen
6599.0                 ! tot_area
0.0              ! glaciation
1.06             ! tot_glaciation
384.0            ! max_soilm
384.0            ! tot_max_soilm
!----------------------------------------
"routed/lak_Mio500.tmp" ! input file name (for variable 1)
0                ! header rows (input file)
8                ! number of columns (input file)
8                ! column number for runoff (variable 1)
!----------------------------------------
"Mio500.std"           ! input file name (for variable 2)
2                ! header rows (input file)
22               ! number of columns (input file)
6                ! column number for precip (variable 2)
!----------------------------------------
"Mio500.std"           ! input file name (for variable 3)
2                ! header rows (input file)
22               ! number of columns (input file)
17               ! column number for soilmoisture (variable 3)
!****************************************
"Mollis"         ! station_name
```

```
"Linth"                 ! river_name
"CH_2372"          ! station_number
47.10107           ! lat
9.071993           ! lon
436.0              ! height
600.0              ! area
600.0              ! tot_area
4.4                ! glaciation
4.4                ! tot_glaciation
40.0               ! max_soilm
40.0               ! tot_max_soilm
!-----------------------------------------
"Gla500.q"         ! input file name (for variable 1)
0                  ! header rows (input file)
14                 ! number of columns (input file)
5                  ! column number for runoff (variable 1)
!-----------------------------------------
"Gla500.std"            ! input file name (for variable 2)
2                  ! header rows (input file)
22                 ! number of columns (input file)
6                  ! column number for precip (variable 2)
!-----------------------------------------
"Gla500.std"            ! input file name (for variable 3)
2                  ! header rows (input file)
22                 ! number of columns (input file)
17                 ! column number for soilmoisture (variable 3)
!*****************************************
"Andelfingen"           ! station_name
"Thur"                  ! river_name
"CH_2044"          ! station_number
47.59652           ! lat
8.681975           ! lon
356.0              ! height
1696.0                  ! area
1696.0                  ! tot_area
0.0                ! glaciation
0.0                ! tot_glaciation
139.0              ! max_soilm
139.0              ! tot_max_soilm
!-----------------------------------------
"Rhine4.q"         ! input file name (for variable 1)
0                  ! header rows (input file)
```

```
14                ! number of columns (input file)
5                 ! column number for runoff (variable 1)
!-----------------------------------------
"Rhine4.std"            ! input file name (for variable 2)
2                 ! header rows (input file)
22                ! number of columns (input file)
6                 ! column number for precip (variable 2)
!-----------------------------------------
"Rhine4.std"            ! input file name (for variable 3)
2                 ! header rows (input file)
22                ! number of columns (input file)
17                ! column number for soilmoisture (variable 3)
!*****************************************
"Wiler"                 ! station_name
"Emme"                  ! river_name
"CH_2155"         ! station_number
47.16007          ! lat
7.547037          ! lon
458.0             ! height
939.0             ! area
939.0             ! tot_area
0.0               ! glaciation
0.0               ! tot_glaciation
120.0             ! max_soilm
120.0             ! tot_max_soilm
!-----------------------------------------
"Rhine9_c1.q"           ! input file name (for variable 1)
0                 ! header rows (input file)
14                ! number of columns (input file)
5                 ! column number for runoff (variable 1)
!-----------------------------------------
"Rhine9_c1.std"         ! input file name (for variable 2)
2                 ! header rows (input file)
22                ! number of columns (input file)
6                 ! column number for precip (variable 2)
!-----------------------------------------
"Rhine9_c1.std"         ! input file name (for variable 3)
2                 ! header rows (input file)
22                ! number of columns (input file)
17                ! column number for soilmoisture (variable 3)
!*****************************************
"Seedorf"         ! station_name
```

```
"Reuss"                 ! river_name
"CH_2056"          ! station_number
46.8839                 ! lat
8.620567           ! lon
438.0              ! height
832.0              ! area
832.0              ! tot_area
9.5                ! glaciation
9.5                ! tot_glaciation
47.5               ! max_soilm
47.5               ! tot_max_soilm
!------------------------------------------
"Rhine11_c1.q"           ! input file name (for variable 1)
0                  ! header rows (input file)
14                 ! number of columns (input file)
5                  ! column number for runoff (variable 1)
!------------------------------------------
"Rhine11_c1.std"   ! input file name (for variable 2)
2                  ! header rows (input file)
22                 ! number of columns (input file)
6                  ! column number for precip (variable 2)
!------------------------------------------
"Rhine11_c1.std"   ! input file name (for variable 3)
2                  ! header rows (input file)
22                 ! number of columns (input file)
17                 ! column number for soilmoisture (variable 3)
!******************************************
```

Appendix 1.2 Basin names, REGION SHORT code, Q1(60 days return period), Q2 (180 days return period), Q3 (10 years return period)

RIVER_AT_STATION	REGION_SHORT	LAND_NUM_CODE	LAT	LON	Area	SUB_BASIN	VP_LEVEL2	VP_LEVEL3_I	Q1	Q2	Q3					
KAMP_AT_ZOEBING	at_zoebing	AT_0270	48.490	15.700	1550.0	0	Eastern_Alps	Niederösterreich_Wien	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
RHÔNE_AT_PORTE_DU_SCEX	CH_2009	CH_2009	46.351	6.889	5220.0	0	Central_Alps	Chablais	330	493	860					
RHÔNE_AT_SION	CH_2011	CH_2011	46.220	7.359	3349.0	0	Central_Alps	Oberwallis	243	362	634					
AARE_AT_BRUGG	CH_2016	CH_2016	47.484	8.190	11750.0	0	Central_Alps	Zentrales_Mittelland	458	643	1073					
REUSS_AT_MELLINGEN	CH_2018	CH_2018	47.422	8.272	3382.0	0	Central_Alps	Zentrales_Mittelland	287	390	629					
TICINO_AT_BELLINZONA	CH_2020	CH_2020	46.200	9.000	1515.0	0	Central_Alps	Ticino	269	584	1320					
THUR_AT_ANDELFINGEN	CH_2044	CH_2044	47.583	8.683	1696.0	0	Central_Alps	Östliches_Mittelland	234	409	818					
AARE_AT_MURGENTHAL	CH_2063	CH_2063	47.267	7.830	10143.0	0	Central_Alps	Zentrales_Mittelland	424	572	916					
EMME_AT_EMMENMATT	CH_2070	CH_2070	46.956	7.750	443.0	0	Central_Alps	Zentraler_Alpennordhang	33	122	325					
RHEIN_AT_RHEINFELDEN	CH_2091	CH_2091	47.562	7.801	34550.0	0	Central_Alps	Östlicher_Jura	1698	2254	3545					
RHEIN_AT_REKINGEN	CH_2143	CH_2143	47.572	8.331	14718.0	0	Central_Alps	Östliches_Mittelland	652	908	1498					
TRESA_AT_ROCCHETTA	CH_2167	CH_2167	45.973	8.854	615.0	0	Central_Alps	Lago_di_Lugano	16	59	161					
THUR_AT_HALDEN	CH_2181	CH_2181	47.507	9.213	1085.0	0	Central_Alps	Linth_und_Thur	249	434	862					
LIMMAT_AT_BADEN	CH_2243	CH_2243	47.477	8.310	2396.0	0	Central_Alps	Östliches_Mittelland	197	281	475					
RHEIN_AT_BASEL	CH_2289	CH_2289	47.561	7.618	35921.0	0	Central_Alps	Östlicher_Jura	1622	2230	3648					
MAGGIA_AT_SOLDUNO	CH_2368	CH_2368	46.167	8.767	926.0	0	Central_Alps	Maggia	234	884	2959					
LINTH_AT_MOLLIS	CH_2372	CH_2372	47.100	9.067	600.0	0	Central_Alps	Linth_und_Thur	75	135	273					
KLEINE EMME_AT_LITTAU	CH_2425	CH_2425	47.068	8.285	477.0	0	Central_Alps	Zentraler_Alpennordhang	99	218	497					
RHEIN_AT_DIEPOLDSAU	CH_2473	CH_2473	47.384	9.642	6119.0	0	Central_Alps	Alpenrhein	445	900	1963					
VERZASCA_AT_LAVERTEZZO	CH_2605	CH_2605	46.250	8.833	186.0	0	Central_Alps	Maggia	80	106	500					
AMMER_AT_PEISSENBERG	de_ammer	DE_0340	47.779	11.059	NN	0	Extended_COPS_Region	Isar	90	152	185					
LECH_AT_AUGSBURG_AGGLOMERATION	de_augsburg	DE_0220	48.360	10.900	1257.0	0	Extended_COPS_Region	Iller_Lech	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
ISAR_AT_BADTOELZ	de_badtoelz	DE_0350	47.762	11.558	NN	0	Extended_COPS_Region	Isar	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
ILLER_AT_WIBLINGEN	de_iller	DE_0360	48.372	9.989	2040.0	0	Extended_COPS_Region	Iller_Lech	170	230	640					
KINZIG_AT_SCHWAIBACH	de_kinzig	DE_0370	48.391	8.034	954.0	0	Extended_COPS_Region	Oberrhein	106	148	533					
LECH_AT_AUGSBURG_WERTACH	de_lech	DE_0380	48.409	10.889	3803.0	0	Extended_COPS_Region	Iller_Lech	245	330	900					
LOISACH_AT_SCHLEHDORF	de_loisach	DE_0390	47.668	11.326	NN	0	Extended_COPS_Region	Isar	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
MURG_AT_ROTENFELS	de_murg	DE_0400	48.820	8.298	466.0	0	Extended_COPS_Region	Oberrhein	68	106	425					
PARTNACH_AT_PARTENKIRCHEN	de_partnach	DE_0230	47.481	11.117	NN	0	Extended_COPS_Region	Isar	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
ISAR_AT_SYLVENSTEINSPEICHER	de_sylvenst	DE_0410	47.587	11.553	NN	0	Extended_COPS_Region	Isar	no hydrological alert thresholds (i.e., ONLY atmospheric alerts issued for this impact area / catchment)							
MURA_AT_GORICAN	hr_mura	HR_0420	46.420	16.694	13148.0	0	Julian_and_Dinaric_Alps	North_Croatia	128	383	971					
AVISIO_AT_STRAMENTIZZO	it_avisio	IT_0430	46.270	11.360	730.0	0	Southern_Alps_and_Po_Valley	Trentino	126	233	478					
BRENTA_AT_BASSANO	it_brenta	IT_0440	45.770	11.730	650.0	0	Southern_Alps_and_Po_Valley	Veneto_sud	246	489	1050					
CHIESE_AT_LAGO_IDRO	it_chiese	IT_0450	45.717	10.433	617.0	0	Southern_Alps_and_Po_Valley	Lombardia_nord	69	121	478					
GRESSONEY_AT_LA_TRIN	it_gr_lt	IT_0130	45.867	7.800	26.0	0	Southern_Alps_and_Po_Valley	Valle_d_Aosta	3	6	13					
GRESSONEY_AT_ST_JEAN	it_gr_sj	IT_0240	45.767	7.833	105.0	0	Southern_Alps_and_Po_Valley	Valle_d_Aosta	13	24	50					
GRESSONEY_AT_ISSIME	it_issime	IT_0460	45.683	7.850	178.0	0	Southern_Alps_and_Po_Valley	Valle_d_Aosta	41	99	235					
MELLA_AT_STOCCHETTA	it_mella	IT_0470	45.600	10.200	312.0	0	Southern_Alps_and_Po_Valley	Lombardia_sud	114	165	280					
TICINO_AT_MIORINA	it_miorina	IT_0250	45.733	8.583	6599.0	0	Central_Alps	Lago_Maggiore	194	718	1925	665	1809	4448	INFLOWS	
OGLIO_AT_SARNICO	it_oglio	IT_0480	45.633	9.933	1840.0	0	Southern_Alps_and_Po_Valley	Lombardia_sud	55	271	769					
PIAVE_AT_SEGUSINO	it_piave	IT_0490	45.917	11.950	3333.0	0	Southern_Alps_and_Po_Valley	Veneto_nord	502	910	1850					
RENO_AT_CASALECCHIO_RENO	it_reno	IT_0500	44.826	10.226	1056.0	0	Southern_Alps_and_Po_Valley	Emilia_Romagna	173	381	860					
SARCA_AT_MASO_GOBBO	it_sarca	IT_0510	46.067	10.917	854.0	0	Southern_Alps_and_Po_Valley	Alto_Aldige_Südtirol	137	248	505					
TARO_AT_PONTETARO	it_taro	IT_0520	44.476	11.285	1372.0	0	Southern_Alps_and_Po_Valley	Emilia_Romagna	246	489	1048					
TOCE_AT_CANDOGLIA	it_toce	IT_0530	45.967	8.433	1534.0	0	Southern_Alps_and_Po_Valley	Toce	306	694	1588					
SOČA_AT_LOG_ČEZSOŠKI	si_cezsoski	SI_0140	46.317	13.500	324.7	0	Julian_and_Dinaric_Alps	West_Slovenia	211.8	279.4	453		no flood forecast			
VIPAVA_AT_DOLENJE	si_dolenje	SI_0540	45.867	13.917	316.7	0	Julian_and_Dinaric_Alps	West_Slovenia	77.2	104.6	189					
SAVA_AT_HRASTNIK	si_hrastnik	SI_0550	46.133	15.100	5176.8	0	Julian_and_Dinaric_Alps	Central_Slovenia	626	892	1668					
KAMNIŠKA BISTRICA_AT_KAMNIK	si_kamnik	SI_0150	46.217	14.617	194.8	0	Julian_and_Dinaric_Alps	Central_Slovenia	44.4	77.2	157		no flood forecast			
SAVINJA_AT_LAŠKO	si_lasko	SI_0560	46.150	15.233	1663.6	0	Julian_and_Dinaric_Alps	Central_Slovenia	269	453	947					
DRAVINJA_AT_LOČE	si_loce	SI_0570	46.317	15.100	175.1	0	Julian_and_Dinaric_Alps	Central_Slovenia	19.5	31.5	71					
SAVINJA_AT_NAZARJE	si_nazarje	SI_0160	46.317	14.967	457.3	0	Julian_and_Dinaric_Alps	Central_Slovenia	61.8	141.4	382		no flood forecast			
IDRIJCA_AT_PODROTEJA	si_podroteja	SI_0170	45.983	14.033	112.8	0	Julian_and_Dinaric_Alps	West_Slovenia	153	189.5	272		no flood forecast			
KOLPA_AT_RADENC	si_radencii	SI_0580	45.467	15.100	1191.0	0	Julian_and_Dinaric_Alps	Central_Slovenia	369	494	881					
SAVA_AT_RADOVLJICA	si_radovl	SI_0180	46.333	14.167	908.0	0	Julian_and_Dinaric_Alps	Central_Slovenia	210	323	615		no flood forecast			
SAVA_AT_ŠENTJAKOB	si_sentjakob	SI_0190	46.083	14.583	2284.8	0	Julian_and_Dinaric_Alps	Central_Slovenia	488	679	1213		no flood forecast			
SOČA_AT_SOLKAN	si_solkan	SI_0590	45.983	13.667	1572.8	0	Julian_and_Dinaric_Alps	West_Slovenia	465	815	1898					
SORA_AT_SUHA	si_suha	SI_0260	46.167	14.333	566.3	0	Julian_and_Dinaric_Alps	Central_Slovenia	140.6	225.8	470					
SELŠKA SORA_AT_ŽELEZNIKI	si_zelezniki	SI_0200	46.233	14.167	104.1	0	Julian_and_Dinaric_Alps	Central_Slovenia	25.9	55.3	132		no flood forecast			
CAUTION: NO SHAPE FILES (AND HENCE NO INFORMATION ON THE VP) AVAILABLE FOR THE FOLLOWING GAUGING STATIONS																
LECH_AT_FÜSSEN	de_fuek	DE_0381	47.566	10.702	1423.0	1	Extended_COPS_Region	Iller_Lech	165	220	600					
LECH_AT_HAUNSTETTEN	de_haun	DE_0382	48.317	10.947	2349.0	2	Extended_COPS_Region	Iller_Lech	190	260	710					
ILLER_AT_IMMENSTADT_ZOLLBRÜCKE	de_immz	DE_0361	47.570	10.236	724.0	1	Extended_COPS_Region	Iller_Lech	135	180	495					
ILLER_AT_KEMPTEN	de_kemp	DE_0362	47.731	10.318	955.0	2	Extended_COPS_Region	Iller_Lech	140	190	515					
ILLER_AT_SONTHOFEN	de_sont	DE_0363	47.525	10.261	388.0	3	Extended_COPS_Region	Iller_Lech	85	110	380					
LECH_AT_STEEG	de_stgl	DE_0383	47.240	10.289	248.0	3	Extended_COPS_Region	Iller_Lech	75	100	270					
LECH_AT_VORDERHORNBACH	de_voho	DE_0384	47.568	10.712	701.0	4	Extended_COPS_Region	Iller_Lech	110	146	397					
LAMBRO_AT_PEREGALLO	it_lampe	IT_0671				1	Southern_Alps_and_Po_Valley									
LAMBRO_AT_MILANO VIA FELTRE	it_lammi	IT_0670	45.49	9.25	562	0	Southern_Alps_and_Po_Valley									
MAGRA_AT_FOCE	it_magfo	IT_0690	44.06	9.97	1636	0	Southern_Alps_and_Po_Valley									
OGLIO_AT_LAGO D'ARNO	it_larno	IT_0441				1	Southern_Alps_and_Po_Valley									
OGLIO_AT_LAGO D'AVIO	it_lavio	IT_0442				1	Southern_Alps_and_Po_Valley									
SARCA_AT_PONTE_PIA'	it_sarcappia	IT_0511	46.05	10.84	587	1	Southern_Alps_and_Po_Valley									
NOCE_AT_SGIUSTINA	it_nocesgiust	IT_0431	46.33	11.06	1050	0	Southern_Alps_and_Po_Valley									
CHIESE_AT_MALGA_BISSINA	it_mbissina	IT_0451				1	Southern_Alps_and_Po_Valley									

Appendix 1.3 Example of the 2007081300_prevah_cosmoch7_a.xml alert file for deterministic models (it can be edited with a text editor or with the LINUX .R code provided by Simon Jaun)

```
<?xml version="1.0" ?>
- <alert_message>
  - <!--
    General information ==============================
    -->
  - <header>
      <author>prevah_cosmoch7</author>
      <type>DetHydro</type>
      <modelname>PREVAH, IAC-ETH/WSL</modelname>
      <drivingdata>COSMO LM7, MeteoSwiss</drivingdata>
      <forecaststart>2007081300</forecaststart>
      <forecastend>2007081600</forecastend>
      <date_of_expiration>2007081513</date_of_expiration>
    </header>
  - <!--
    Level 3 ========================================
    -->
  - <regions_details start="2007081301" end="2007081600" deltahour="1" nof_timesteps="72">
    - <alert region_short="CH_2605" region="VERZASCA_AT_LAVERTEZZO">
        0 0 0 
```

0 0 0

```
Level 1/2 ==============================
  -->
- <regions_summary start="20070813" end="20070815" nof_day="3">
    <alert region_short="CH_2605" region="VERZASCA_AT_LAVERTEZZO">0 0 0</alert>
    <alert region_short="CH_2368" region="MAGGIA_AT_SOLDUNO">0 0 0</alert>
    <alert region_short="CH_2020" region="TICINO_AT_BELLINZONA">0 0 0</alert>
    <alert region_short="CH_2167" region="TRESA_AT_ROCCHETTA">1 1 1</alert>
    <alert region_short="IT_TOCE" region="TOCE_AT_CANDOGLIA">0 0 0</alert>
    <alert region_short="IT_MIORINA" region="TICINO_AT_MIORINA">1 1 1</alert>
    <alert region_short="CH_2372" region="LINTH_AT_MOLLIS">0 0 0</alert>
    <alert region_short="CH_2044" region="THUR_AT_ANDELFINGEN">0 0 0</alert>
  </regions_summary>
</alert_message>
```

Appendix 1.3 Example of the 2007081300_prevah_cleps_a.xml alert file for Ensemble models

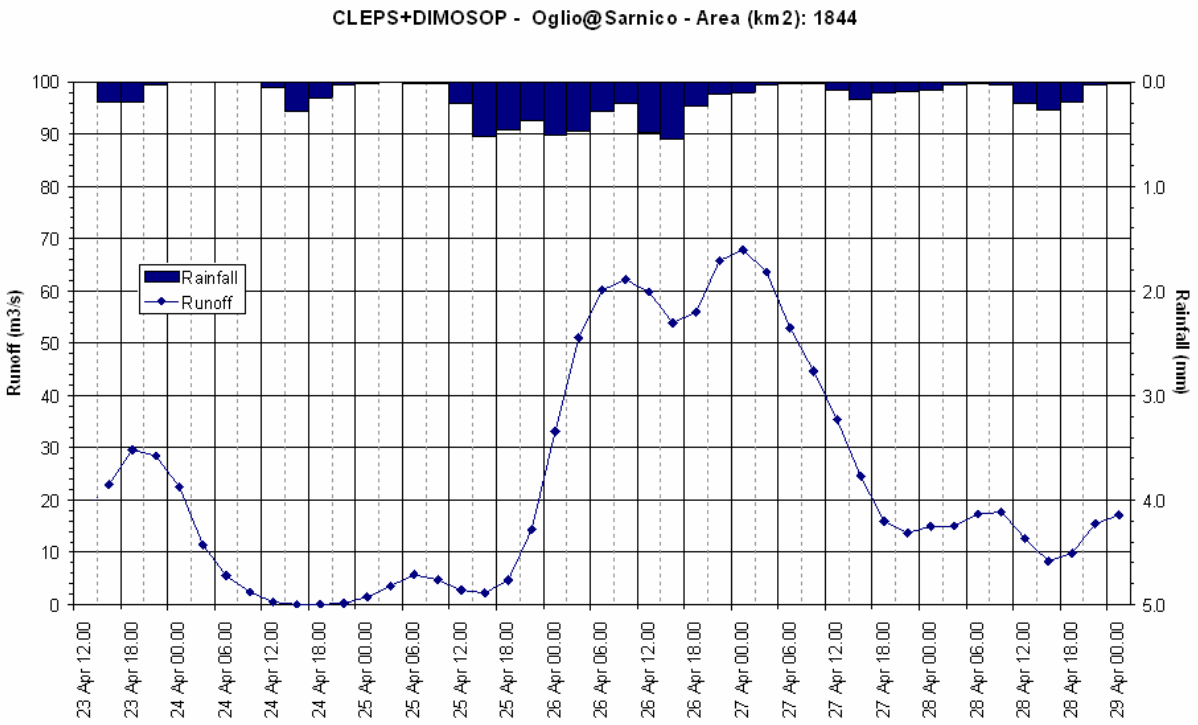
```
<?xml version="1.0" ?>
- <alert_message>
  - <!--
    General information ==============================
    -->
  - <header>
      <author>prevah_cleps</author>
      <type>ProbHydro</type>
      <modelname>PREVAH, IAC-ETH/WSL</modelname>
      <drivingdata>COSMO LEPS, MeteoSwiss</drivingdata>
      <forecaststart>2007081300</forecaststart>
      <forecastend>2007081800</forecastend>
      <date_of_expiration>2007081513</date_of_expiration>
    </header>
  - <!--
    Level 3 ========================================
    -->
  - <regions_details start="2007081301" end="2007081800" deltahour="1" nof_timesteps="120">
    - <alert region_short="CH_2605" region="VERZASCA_AT_LAVERTEZZO">
        0 0 0 
```

<prob>100 100 100

0 0 0

```
      <alert_comment>max median: 39.469 m3/s on Fri 17.08, 20 UTC; max member: 179.278 m3/s on Fri
        17.08, 10 UTC; max spread: 152.093 m3/s on Fri 17.08, 10 UTC</alert_comment>
    </alert>
  - <alert region_short="CH_2044" region="THUR_AT_ANDELFINGEN">
      0 0 0 
```

Appendix 1.4 Example 2007042312_DIMOSOP_CLEPS_it_oglio.png figure



Appendix 2 Instructions for the WDCC from Claudia Wunram
(general_info_data_archive on the DPHASE website)

Appendix 3 File make_ckecksum.sh

File **make_ckecksum.sh**

```
#!/bin/sh


compute_sum() {
    sum=`cksum $1`
    crc=${sum%% *}
    sum=${sum#* }
    bytes=${sum%% *}
}


usage() {
    echo "Use: $0 [-v|-a|-c|-f] file1 [file2] ..."
    echo "Options:"
    echo "-v to view the checksum"
    echo "-a to apply the checksum to the file"
    echo "   file is renamed and the new name is printed on stdout"
    echo "-c to check the checksum applied to the file"
    echo "-f to perform a final check"
    echo "   file is renamed again if check passed"
    echo "   or deleted if the check fails"
    echo "-t transfer files"


   echo "Exit codes:"
    echo " 0 if everything is correct"
    echo " 1 if check fails (-c, -f)"
    echo " 2 if file not found"
    exit 3
}




transfer=0

homescript=/prj/mh0388/arch/dphase_dryrun/scripts
host=archive.dkrz.de


username=YOURACC
#where YOURACC is your account name

remotedir=/prj/mh0388/arch/dphase_dryrun/hydro/YOURMOD/TYP
#where YOURMOD is your hydrological model name (e.g. DIMOSOP) and TYP is the
#TYPE of data (MOD, OBS, RAD, MIX)


[ "$#" -lt 2 ] && usage
act=$1
shift

for file in $*; do
    [ -f "$file" ] || exit 2 # file not found

    compute_sum $file
```

```
    if [ "$act" = -v ]; then # view checksum
      echo "$file $crc $bytes"

    elif [ "$act" = -t ]; then # apply checksum and print name to stdout
      transfer=1


    elif [ "$act" = -a ]; then # apply checksum and print name to stdout
      mv "$file" "$file,$crc,$bytes"
      echo "$file,$crc,$bytes"

      newname="$file,$crc,$bytes"

    elif [ "$act" = -c ]; then # check checksum in name against contents
      cbytes=${file##*,}
      file=${file%,*}
      ccrc=${file##*,}
      [ "$crc" = "$ccrc" -a "$bytes" = "$cbytes" ] || exit 1 # file corrupted
    elif [ "$act" = -f ]; then # final check: delete or rename again
      cbytes=${file##*,}
      file1=${file%,*}
      ccrc=${file1##*,}
      if [ "$crc" = "$ccrc" -a "$bytes" = "$cbytes" ]; then
          mv "$file" "$file,$crc,$bytes"
      else # file corrupted
          rm -f $file
          exit 1
      fi
    else
      usage
    fi



    if [ $transfer -gt 0 ]; then
      echo "Make transfer"
      mv "$file" "$file,$crc,$bytes"
      echo "$file,$crc,$bytes"

      checked_file="$file,$crc,$bytes"


#checked_file=`make_checksum.sh -a $myfile`
      retry=0
      success=0
# # retry up to 4 times
      while [ "$retry" -le 4 ]; do
#     # use you preferred transferring method here:
#     #transfer_by_ftp $username $host $remotedir $checked_file
#     # check the transferred file
#     # exit code 0 => ok, otherwise file corrupted or missing
#     # need to setup ssh without password (public key)

          echo "Transfer file $checked_file "
          scp $checked_file  $username@$host:$remotedir/
          echo "Remote checksum"
          ssh $username@$host $homescript/make_checksum.sh -f
$remotedir/$checked_file
#         [ "$?" = 0 ] && echo "Remote checksum ok"; success=1; break # success

          if   [ "$?" -le  0 ]; then
```

```
            echo "Remote checksum ok";
            success=1;
            break # success
          fi

          let " retry= $retry+1"
          echo TRY num $retry

      done

      if [ $success -le 0 ]; then
          echo "Tranfer file ERROR !!!"
      fi

    fi


done

exit 0
```

Appendix 4 xml generator package (including R code in DPHASE_HYDRO_package30.zip file)

Appendix 5 netcdf generator package (including FORTRAN code in DPHASE_HYDRO_package30.zip file).